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WOODED STRIPS AND WINDBREAKS IN KANSAS, 1981

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ABSTRACT.—In 1981 wooded strips and windbreaks in Kansas covered 336,000 acres and were more than 54,000 miles long. Wooded strips contained 300 million board feet of sawtimber and 92 million cubic feet of growing stock.

KEY WORDS: Shelter belts, forest, land use, nonforest with trees, sawtimber, board foot, sampling, area, volume, length.

In the Great Plains much of the forest land is in wooded strips and windbreaks. Wooded strips are areas that would otherwise meet the USDA Forest Service definition of commercial forest land but are less than 120 feet wide.[1] Most wooded strips occur along river and stream banks. Windbreaks are areas of trees less than 120 feet wide that wwere planted or maintained to protect crops, livestock or buildings. Most windbreaks have been planted since 1934 through the efforts of several Federal and State programs. Windbreaks have no minimum acreage or productivity such as have been established for wooded strips and commercial forest land.

Wooded strips and windbreaks are an important forest resource. They protect soil and field crops from the wind; reduce evaporation of water from streams, rivers and irrigation ditches; and provide habitat for many wildlife species. In the Plains States the volume of timber in these land areas is significant. Chase and Strickler (1968) estimated the total area of wooded strips in Kansas to be 214,600 acres, or 20 percent of the commercial forest land area in the State.

In recent years the area of windbreaks has decreased in the Great Plains. A 20 percent decrease in windbreak area between the late 1950's and early 1970's was reported for a 13 county area in Central Kansas (Sorenson and Marotz 1977). A similar trend was shown in a study of 16 counties in Oklahoma, Kansas, and Nebraska (USDA 1975). Although these surveys were not complete and did not cover an extensive area, they did point out a decreasing trend in these areas and warn that this could be a serious problem. Reasons cited for this decline include efforts to get more area into crop production, increased use of centerpivot irrigation systems, deterioration of old windbreaks and changing conservation techniques. Both of these reports stress the need for reliable information on the current status of windbreaks throughout the Great Plains.

The Forest Inventory and Analysis Unit of the North Central Forest Experiment Station conducts periodic inventories of the forest resources for many of the States in the Great Plains. In past inventories a two-phase point sampling technique was used to sample all land classes, including wooded strips and windbreaks. Because of the small area occupied by strips and windbreaks, few samples were taken in them and the resulting sampling errors were high. As part of the 1981 Kansas forest inventory, line intersect sampling was used to sample wooded strips and windbreaks. This method enabled us to estimate area and volume of wooded strips and windbreaks just as in past inventories, but it also enabled us to estimate length of these strips. For many management applica-

[1] *The USDA Forest Service defines commercial forest land as forest land that is capable of producing 20 cubic feet/acre/year of industrial wood and is not withdrawn from timber utilization by statute or administrative regulation. Areas of commercial forest land must be at least 1 acre in size and 120 feet wide.*

tions length information is more useful than area information. This paper presents area, volume, and length information obtained in the inventory.

INVENTORY FINDINGS

In 1981 wooded strips and windbreaks in Kansas covered 336,000 acres and had a total length of more than 54,000 miles (tables 1 and 2). Wooded strips contained 300 million board feet of sawtimber (table 3) and 92 million cubic feet of growing stock (table 4) for 10 percent of both the total growing-stock and sawtimber volumes in the State.[2]

The length estimates presented in this paper reflect the current status of wooded strips and windbreaks as defined by the USDA Forest Service. Figure 1 and tables 5, 6, and 7 show the location of this resource and give breakdowns by forest type, strip width, and number of rows. These breakdowns are based on aerial photographic estimates of forest type, str width, and number of rows with no adjustment f interpretation errors. Total length estimates a length estimates by Unit or county have an adjustme for photo interpretation errors but further brea downs by other categories do not. It is difficult compare estimates from this survey to estimates th have been reported in the past because of differenc in definitions and areas covered by these surveys.

The line intercept sampling procedure accurate estimated wooded strip and windbreak length. Stan ard errors of 8 percent were obtained using th method at both the State and Unit level. The tw phase point sampling procedure estimated area, n length, and had higher standard errors at the Un level but a slightly lower standard error for the Sta total.

When area or length of wooded strips and win breaks are estimated for areas smaller than the enti State, sampling errors increase due to the reduce number of plots because of the nature of the regre sion estimator used. Estimates of total area a length of wooded strips and windbreaks in the thr

[2] *Volume was not measured on windbreaks because they are not considered to be available for timber production.*

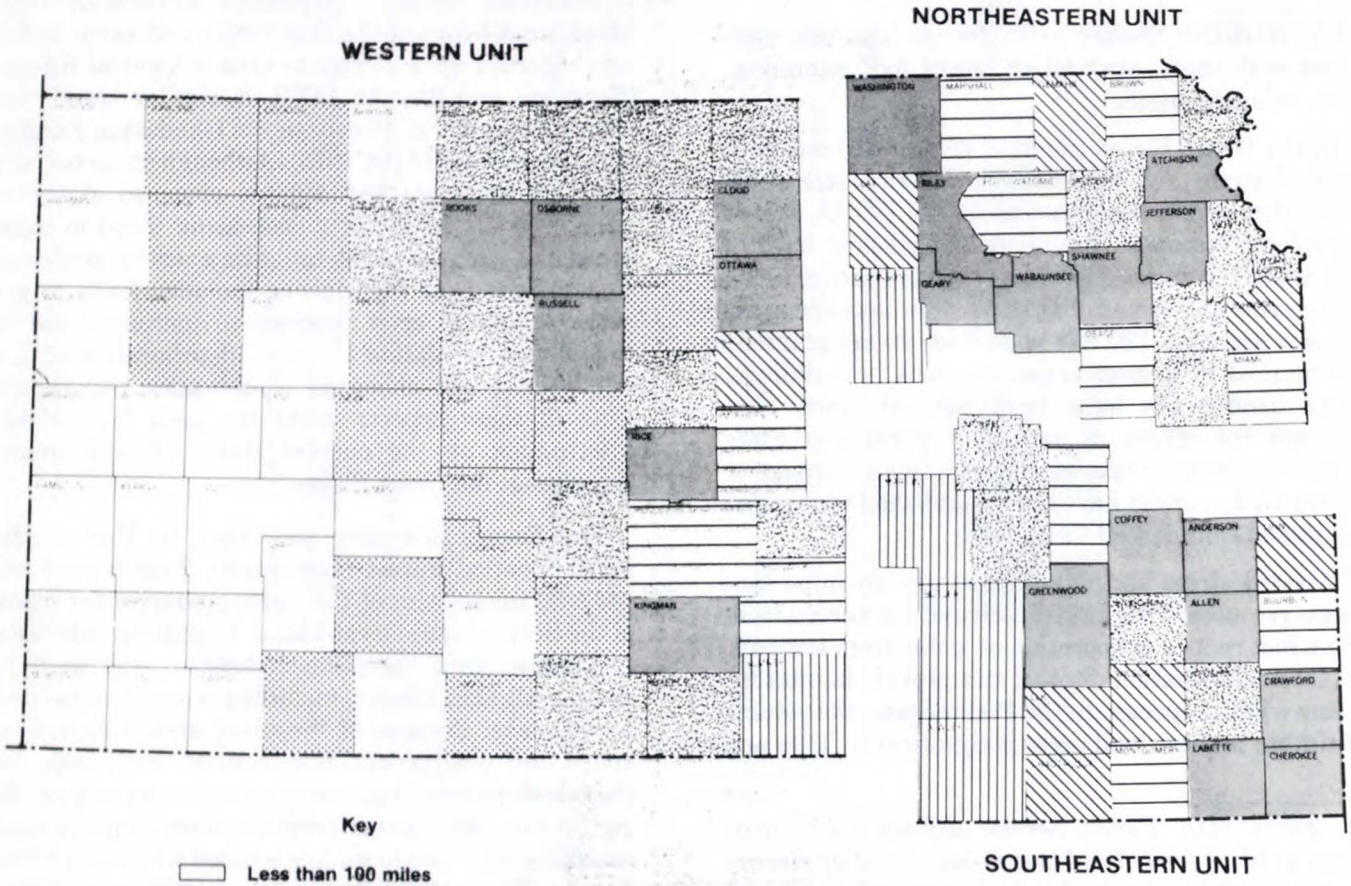

Figure 1.—*Wooded strip and windbreak length by county, Kansas, 198*

Table 1.--Estimated area and length of wooded strips and windbreaks by Unit, Kansas 1981

	State Total	Unit		
		Northeast	Southeast	West
Area of wooded strips and windbreaks (acres)	336,263	105,629	117,157	113,477
Standard error (acres)	21,500	10,600	11,400	16,400
Length of wooded strips and windbreaks (miles)	54,075	17,235	18,026	18,814
Standard error (miles)	4,215	1,356	1,435	1,496

Table 2.--Estimated area and length of wooded strips and windbreaks by county, Kansas, 1981

NORTHEASTERN UNIT

County	Area			Length		
	Wooded strips	Windbreaks	Total	Wooded strips	Windbreaks	Total
	-Acres-			-Miles-		
Atchison	1,782	1,547	3,329	250	427	677
Brown	1,270	2,380	3,650	542	681	1,223
Clay	936	279	1,215	293	615	908
Dickinson	1,153	1,630	2,783	436	1,286	1,722
Doniphan	1,944	589	2,533	281	136	417
Douglas	2,459	3,069	5,528	109	372	481
Franklin	2,503	1,595	4,098	145	334	479
Geary	1,474	653	2,127	299	218	517
Jackson	6,434	3,019	9,453	492	320	812
Jefferson	3,033	4,695	7,728	295	322	617
Johnson	2,139	2,019	4,158	184	606	790
Leavenworth	5,932	3,482	9,414	252	229	481
Marshall	4,010	2,927	6,937	637	397	1,034
Miami	5,154	1,253	6,407	411	971	1,382
Nemaha	1,816	516	2,332	227	256	483
Osage	3,366	4,335	7,701	462	876	1,338
Pottawatomie	3,699	1,257	4,956	538	544	1,082
Riley	2,165	1,486	3,651	340	327	667
Shawnee	2,241	2,500	4,741	603	--	603
Wabaunsee	3,186	1,514	4,700	488	238	726
Washington	5,441	2,286	7,727	531	197	728
Wyandotte	453	8	461	32	36	68
All counties	62,590	43,039	105,629	7,847	9,388	17,235

SOUTHEASTERN UNIT

County	Area			Length		
	Wooded strips	Windbreaks	Total	Wooded strips	Windbreaks	Total
	-Acres-			-Miles-		
Allen	2,248	2,481	4,729	567	--	567
Anderson	2,058	2,048	4,106	530	5	535
Bourbon	1,973	11,351	13,324	331	776	1,107
Butler	6,503	4,728	11,231	413	1,606	2,019
Chase	2,113	1,412	3,525	368	--	368
Chautauqua	3,006	3,006	6,012	517	295	812
Cherokee	2,816	3,945	6,761	100	495	595
Coffey	876	2,310	3,186	136	390	526
Cowley	2,925	2,913	5,838	571	1,316	1,887
Crawford	3,318	2,918	6,236	603	--	603
Elk	1,474	1,006	2,480	404	499	903
Greenwood	5,108	2,336	7,444	712	--	712
Labette	1,000	3,261	4,261	41	558	599
Linn	3,234	732	3,966	204	721	925
Lyon	2,377	999	3,376	513	540	1,053
Marion	796	1,831	2,627	436	1,225	1,661
Montgomery	2,160	1,533	3,693	259	848	1,107
Morris	1,405	391	1,796	268	209	477
Neosho	1,119	3,003	4,122	41	349	390
Wilson	2,291	12,785	15,076	159	703	862
Woodson	1,451	1,917	3,368	141	177	318
All counties	50,251	66,906	117,157	7,314	10,712	18,026

(Table 2 continued)

WESTERN UNIT

County	Area			Length		
	Wooded strips	Windbreaks	Total	Wooded strips	Windbreaks	Total
	-Acres-			-Miles-		
Barber	2,154	1,552	3,706	281	141	422
Barton	118	--	118	95	111	206
Cheyenne	1,749	670	2,419	52	32	84
Clark	645	1,639	2,284	109	88	197
Cloud	59	2,148	2,207	277	227	504
Comanche	363	655	1,018	52	82	134
Decatur	838	8	846	127	11	138
Edwards	203	192	395	61	155	216
Ellis	288	692	980	354	34	388
Ellsworth	597	388	985	254	70	324
Finney	59	--	59	47	32	79
Ford	363	656	1,019	44	79	123
Gove	--	857	857	54	--	54
Graham	1,108	801	1,909	345	36	381
Grant	109	327	436	13	7	20
Gray	88	--	88	7	29	36
Greeley	--	--	--	--	7	7
Hamilton	432	--	432	34	270	304
Harper	1,403	6,710	8,113	139	213	352
Harvey	686	755	1,441	29	241	270
Haskell	--	--	--	--	7	7
Hodgeman	--	--	--	124	5	129
Jewell	1,497	761	2,258	252	--	252
Kearny	--	--	--	7	34	41
Kingman	1,619	5,079	6,698	152	454	606
Kiowa	1,196	--	1,196	41	57	98
Lane	29	--	29	23	47	70
Lincoln	871	1,005	1,876	202	29	231
Logan	114	8	122	102	34	136
Mcpherson	682	886	1,568	179	894	1,073
Meade	59	--	59	77	86	163
Mitchell	1,616	3,192	4,808	125	181	306
Morton	383	--	383	41	25	66
Ness	--	16	16	184	18	202
Norton	673	336	1,009	189	11	200
Osborne	671	879	1,550	465	102	567
Ottawa	280	3,184	3,464	186	336	522
Pawnee	1,592	736	2,328	120	18	138
Phillips	1,680	2,045	3,725	363	41	404
Pratt	61	200	261	34	141	175
Rawlins	383	16	399	186	39	225
Reno	884	7,455	8,339	134	1,030	1,164
Republic	947	1,844	2,791	331	5	336
Rice	168	729	897	107	426	533
Rooks	1,434	2,720	4,154	422	104	526
Rush	57	--	57	111	50	161
Russell	197	132	329	497	79	576
Saline	368	1,407	1,775	456	338	794
Scott	--	8	8	16	16	32
Sedgwick	719	4,571	5,290	84	1,282	1,366
Seward	601	343	944	16	54	70
Sheridan	86	102	188	209	50	259
Sherman	--	--	--	11	82	93
Smith	3,987	96	4,083	276	39	315
Stafford	360	2,470	2,830	43	261	304
Stanton	--	--	--	9	14	23
Stevens	116	--	116	5	77	82
Sumner	2,083	16,891	18,974	152	1,749	1,901
Thomas	--	190	190	50	109	159
Trego	334	679	1,013	152	27	179
Wallace	110	328	438	18	5	23
Wichita	--	--	--	23	45	68
All counties	37,119	76,358	113,477	8,548	10,266	18,814
All units	149,960	186,303	336,263	23,709	30,366	54,075

Table 3.--Net volume of sawtimber[1/] and short-log[2/] trees on commercial forest land and wooded strips, by species group and Forest Survey Unit, Kansas, 1981

(In thousand board feet)[3/]

Species group	Total	Commercial forest land		Wooded strips	
		Sawtimber trees	Short-log trees	Sawtimber trees	Short-log trees
ALL UNITS					
SOFTWOODS					
Eastern redcedar	12,870	10,871	779	1,220	--
Total	12,870	10,871	779	1,220	--
HARDWOODS					
Bur oak	350,299	286,120	16,080	48,099	--
Select white oak	119,652	107,383	12,269	--	--
Other white oak	38,525	36,531	1,994	--	--
Select red oak	192,823	183,457	4,733	4,633	--
Other red oak	128,529	118,665	6,328	3,536	--
Select hickory	44,878	43,047	1,831	--	--
Other hickory	27,293	24,649	1,685	959	--
Pecan	33,204	28,043	1,903	2,860	398
Hard maple	6,613	6,280	333	--	--
Soft maple	101,089	87,834	2,571	10,684	--
Ash	236,913	185,760	11,798	34,894	4,461
Cottonwood	707,410	610,060	13,704	83,646	--
Basswood	28,141	25,763	1,571	807	--
Elm	92,790	69,531	12,387	9,199	1,673
Black walnut	192,760	169,979	13,121	8,669	991
Willow	57,075	47,901	2,355	6,433	386
Boxelder	39,152	22,839	7,992	5,125	3,196
Hackberry	363,523	299,581	21,596	41,472	874
Sycamore	120,423	105,631	370	14,422	--
Other hardwoods	135,631	96,304	12,504	23,399	3,424
Total	3,016,723	2,555,358	147,125	298,837	15,403
All species	3,029,593	2,566,229	147,904	300,057	15,403
NORTHEASTERN UNIT					
SOFTWOODS					
Eastern redcedar	5,209	5,106	103	--	--
Total	5,209	5,106	103	--	--
HARDWOODS					
Bur oak	136,514	124,290	8,605	3,619	--
Select white oak	87,258	77,476	9,782	--	--
Other white oak	6,476	6,145	331	--	--
Select red oak	106,363	104,284	2,079	--	--
Other red oak	76,262	70,133	3,922	2,207	--
Select hickory	24,651	24,060	591	--	--
Other hickory	15,851	14,453	1,398	--	--
Pecan	575	575	--	--	--
Hard maple	3,635	3,635	--	--	--
Soft maple	53,320	44,464	1,384	7,472	--
Ash	57,355	42,154	2,698	12,186	317
Cottonwood	212,554	196,103	2,572	13,879	--
Basswood	27,185	24,807	1,571	807	--
Elm	33,538	25,507	3,148	4,536	347
Black walnut	111,345	96,526	8,285	5,543	991
Willow	23,260	19,065	257	3,938	--
Boxelder	9,787	5,924	1,818	1,129	916
Hackberry	133,687	112,814	8,586	11,413	874
Sycamore	64,790	56,268	--	8,522	--
Other hardwoods	81,192	53,824	6,979	18,801	1,588
Total	1,265,598	1,102,507	64,006	94,052	5,033
All species	1,270,807	1,107,613	64,109	94,052	5,033

[1/] Net volume of the saw log portion of live sawtimber trees (softwoods 9.0 inches d.b.h. and larger and hardwoods 11.0 inches d.b.h. and larger) from stump to a minimum 7 inches top diameter outside bark for softwoods and 9 inches for hardwoods.

[2/] A live sawtimber-sized tree of commercial species that has at least one 8-foot log, but less than a 12-foot log, that meets minimum log grade specifications and therefore is not classified as growing stock.

[3/] International 1/4-inch rule.

(Table 3 continued)

Species group	Total	Commercial forest land		Wooded strips	
		Sawtimber trees	Short-log trees	Sawtimber trees	Short-log trees
SOUTHEASTERN UNIT					
SOFTWOODS					
Eastern redcedar	6,441	5,765	676	--	--
Total	6,441	5,765	676	--	--
HARDWOODS					
Bur oak	83,901	72,739	3,331	7,831	--
Select white oak	32,394	29,907	2,487	--	--
Other white oak	32,049	30,386	1,663	--	--
Select red oak	86,460	79,173	2,654	4,633	--
Other red oak	52,267	48,532	2,406	1,329	--
Select hickory	20,227	18,987	1,240	--	--
Other hickory	11,442	10,196	287	959	--
Pecan	31,869	26,708	1,903	2,860	398
Hard maple	2,978	2,645	333	--	--
Soft maple	47,363	43,370	781	3,212	--
Ash	96,218	87,049	3,406	3,867	1,896
Cottonwood	45,351	39,358	1,244	4,749	--
Basswood	956	956	--	--	--
Elm	40,542	29,537	5,016	4,663	1,326
Black walnut	73,954	65,992	4,836	3,126	--
Willow	18,858	16,467	637	1,368	386
Boxelder	13,231	6,077	1,488	3,996	1,670
Hackberry	158,074	137,513	5,239	15,322	--
Sycamore	53,923	47,653	370	5,900	--
Other hardwoods	38,647	29,536	2,677	4,598	1,836
Total	940,704	822,781	41,998	68,413	7,512
All species	947,145	828,546	42,674	68,413	7,512
WESTERN UNIT					
SOFTWOODS					
Eastern redcedar	1,220	--	--	1,220	--
Total	1,220	--	--	1,220	--
HARDWOODS					
Bur oak	129,884	89,091	4,144	36,649	--
Select white oak	--	--	--	--	--
Other white oak	--	--	--	--	--
Select red oak	--	--	--	--	--
Other red oak	--	--	--	--	--
Select hickory	--	--	--	--	--
Other hickory	--	--	--	--	--
Pecan	760	760	--	--	--
Hard maple	--	--	--	--	--
Soft maple	406	--	406	--	--
Ash	83,340	56,557	5,694	18,841	2,248
Cottonwood	449,505	374,599	9,888	65,018	--
Basswood	--	--	--	--	--
Elm	18,710	14,487	4,223	--	--
Black walnut	7,461	7,461	--	--	--
Willow	14,957	12,369	1,461	1,127	--
Boxelder	16,134	10,838	4,686	--	610
Hackberry	71,762	49,254	7,771	14,737	--
Sycamore	1,710	1,710	--	--	--
Other hardwoods	15,792	12,944	2,848	--	--
Total	810,421	630,070	41,121	136,372	2,858
All species	811,641	630,070	41,121	137,592	2,858

State Units are shown in table 1 along with estimated standard errors.

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Table 4.--Net volume[1/] of growing-stock[2/] and short-log trees on commercial forest land and wooded strips, by species group and Forest Survey Unit, Kansas, 1981

(In thousand cubic feet)

Species group	Total	Commercial forest land		Wooded strips	
		Growing-stock trees	Short-log trees	Growing-stock trees	Short-log trees
ALL UNITS					
SOFTWOODS					
Eastern redcedar	6,077	4,591	410	1,076	--
Total	6,077	4,591	410	1,076	--
HARDWOODS					
Bur oak	78,929	60,920	6,634	11,301	74
Select white oak	39,284	34,121	4,875	258	30
Other white oak	21,641	19,854	1,787	--	--
Select red oak	49,432	45,828	1,755	1,658	191
Other red oak	30,416	27,445	2,097	874	--
Select hickory	18,493	17,388	928	177	--
Other hickory	13,399	11,693	934	733	39
Pecan	10,665	8,986	757	798	124
Hard maple	3,245	3,120	125	--	--
Soft maple	25,042	21,011	1,078	2,953	--
Ash	80,493	61,700	5,446	11,082	2,265
Cottonwood	162,335	134,292	4,011	24,032	--
Basswood	7,109	6,031	734	344	--
Elm	44,980	30,599	8,010	5,154	1,217
Black walnut	67,416	57,868	5,495	3,368	685
Willow	14,014	11,629	821	1,475	89
Boxelder	17,609	10,376	3,487	2,174	1,572
Hackberry	109,599	86,674	9,118	12,710	1,097
Sycamore	26,445	21,538	250	4,657	--
Other hardwoods	52,671	35,651	8,677	6,719	1,624
Total	873,217	706,724	67,019	90,467	9,007
All species	879,294	711,315	67,429	91,543	9,007
NORTHEASTERN UNIT					
SOFTWOODS					
Eastern redcedar	2,851	2,446	225	180	--
Total	2,851	2,446	225	180	--
HARDWOODS					
Bur oak	34,479	29,902	3,708	869	--
Select white oak	25,682	22,050	3,602	--	30
Other white oak	2,315	2,107	208	--	--
Select red oak	26,738	25,577	911	250	--
Other red oak	16,583	15,385	788	410	--
Select hickory	12,395	11,801	430	164	--
Other hickory	7,690	6,665	719	267	39
Pecan	265	265	--	--	--
Hard maple	1,938	1,938	--	--	--
Soft maple	13,003	10,459	633	1,911	--
Ash	18,511	13,845	1,283	3,159	224
Cottonwood	48,389	43,561	1,017	3,811	--
Basswood	6,696	5,618	734	344	--
Elm	19,950	13,932	3,066	2,571	381
Black walnut	37,917	32,366	2,945	1,959	647
Willow	6,204	5,021	235	948	--
Boxelder	6,169	3,563	865	1,191	550
Hackberry	45,013	37,640	2,871	3,883	619
Sycamore	14,808	11,447	26	3,335	--
Other hardwoods	30,233	19,505	4,520	5,347	861
Total	374,978	312,647	28,561	30,419	3,351
All species	377,829	315,093	28,786	30,599	3,351

[1/] Growing-stock volume--Net volume in cubic feet of growing stock trees 5.0 inches d.b.h. and over from a 1-foot stump to a minimum 4.0 inch top diameter outside bark of the central stem or to the point where the central stem no longer meets pulpwood specifications.

[2/] Growing-stock trees--Live trees of commercial species qualifying as acceptable trees. (Note: Excludes rough, rotten, and dead trees.)

(Table 4 continued)

Species group	Total	Commercial forest land: Growing-stock trees	Commercial forest land: Short-log trees	Wooded strips: Growing-stock trees	Wooded strips: Short-log trees
SOUTHEASTERN UNIT					
SOFTWOODS					
Eastern redcedar	2,297	2,112	185	--	--
Total	2,297	2,112	185	--	--
HARDWOODS					
Bur oak	19,183	15,644	1,613	1,852	74
Select white oak	13,602	12,071	1,273	258	--
Other white oak	19,326	17,747	1,579	--	--
Select red oak	22,694	20,251	844	1,408	191
Other red oak	13,833	12,060	1,309	464	--
Select hickory	6,098	5,587	498	13	--
Other hickory	5,709	5,028	215	466	--
Pecan	10,257	8,578	757	798	124
Hard maple	1,307	1,182	125	--	--
Soft maple	11,912	10,552	318	1,042	--
Ash	30,634	26,734	1,759	1,232	909
Cottonwood	11,272	9,786	438	1,048	--
Basswood	413	413	--	--	--
Elm	19,065	12,589	3,150	2,490	836
Black walnut	26,920	23,004	2,469	1,409	38
Willow	4,860	4,204	284	283	89
Boxelder	4,114	1,831	708	983	592
Hackberry	45,226	38,441	2,275	4,328	182
Sycamore	11,333	9,787	224	1,322	--
Other hardwoods	15,694	11,527	2,032	1,372	763
Total	293,452	247,016	21,870	20,768	3,798
All species	295,749	249,128	22,055	20,768	3,798
WESTERN UNIT					
SOFTWOODS					
Eastern redcedar	929	33	--	896	--
Total	929	33	--	896	--
HARDWOODS					
Bur oak	25,267	15,374	1,313	8,580	--
Select white oak	--	--	--	--	--
Other white oak	--	--	--	--	--
Select red oak	--	--	--	--	--
Other red oak	--	--	--	--	--
Select hickory	--	--	--	--	--
Other hickory	--	--	--	--	--
Pecan	143	143	--	--	--
Hard maple	--	--	--	--	--
Soft maple	127	--	127	--	--
Ash	31,348	21,121	2,404	6,691	1,132
Cottonwood	102,674	80,945	2,556	19,173	--
Basswood	--	--	--	--	--
Elm	5,965	4,078	1,794	93	--
Black walnut	2,579	2,498	81	--	--
Willow	2,950	2,404	302	244	--
Boxelder	7,326	4,982	1,914	--	430
Hackberry	19,360	10,593	3,972	4,499	296
Sycamore	304	304	--	--	--
Other hardwoods	6,744	4,619	2,125	--	--
Total	204,787	147,061	16,588	39,280	1,858
All species	205,716	147,094	16,588	40,176	1,858

Table 5.--Length of wooded strips by forest type and width, Kansas, 1981

(In miles)

Width of wooded strip	Forest type			
	Spruce	Oak-hickory	Elm-ash-Cottonwood	Total
		NORTHEASTERN UNIT		
0-1 Chains	2	742	2,926	3,670
1-2 Chains	--	690	3,487	4,177
Total	2	1,432	6,413	7,847
		SOUTHEASTERN UNIT		
0-1 Chains	--	858	2,781	3,639
1-2 Chains	--	506	3,169	3,675
Total	--	1,364	5,950	7,314
		WESTERN UNIT		
0-1 Chains	--	256	3,426	3,682
1-2 Chains	--	156	4,710	4,866
Total	--	412	8,136	8,548
		STATE TOTAL		
0-1 Chains	2	1,856	9,133	10,991
1-2 Chains	--	1,352	11,366	12,718
Total	2	3,208	20,499	23,709

Table 6.--Length of windbreaks by forest type and width, Kansas, 1981

(In miles)

Width of windbreak	Forest type				
	Pine	Eastern redcedar	Oak-hickory	Elm-ash-cottonwood	Total
			NORTHEASTERN UNIT		
0-1 Chains	--	5	6,701	1,667	8,373
1-2 Chains	--	5	574	436	1,015
Total	--	10	7,275	2,103	9,388
			SOUTHEASTERN UNIT		
0-1 Chains	--	--	6,992	2,563	9,555
1-2 Chains	--	--	907	250	1,157
Total	--	--	7,899	2,813	10,712
			WESTERN UNIT		
0-1 Chains	7	--	3,723	3,741	7,471
1-2 Chains	7	--	914	1,874	2,795
Total	14	--	4,637	5,615	10,266
			STATE TOTAL		
0-1 Chains	7	5	17,416	7,971	25,399
1-2 Chains	7	5	2,395	2,560	4,967
Total	14	10	19,811	10,531	30,366

Table 7.--Length of windbreaks by forest type and number of rows, Kansas, 1981

(In miles)

Number of rows in windbreaks	Forest type				
	Pine	Eastern redcedar	Oak-hickory	Elm-ash-cottonwood	Total
			NORTHEASTERN UNIT		
0 Rows	--	--	367	295	662
1 Row	--	5	6,159	1,329	7,493
2 Rows	--	3	556	322	881
3+ Rows	--	2	193	157	352
Total	--	10	7,275	2,103	9,388
			SOUTHEASTERN UNIT		
0 Rows	--	--	141	113	254
1 Row	--	--	6,760	2,228	8,988
2 Rows	--	--	962	354	1,316
3+ Rows	--	--	36	118	154
Total	--	--	7,899	2,813	10,712
			WESTERN UNIT		
0 Rows	--	--	451	318	769
1 Row	5	--	3,271	3,326	6,602
2 Rows	9	--	565	1942	2,516
3+ Rows	--	--	350	29	379
Total	14	--	4,637	5,615	10,266
			STATE TOTAL		
0 Rows	--	--	959	726	1,685
1 Row	5	5	16,190	6,883	23,083
2 Rows	9	3	2,083	2,618	4,713
3+ Rows	--	2	579	304	885
Total	14	10	19,811	10,531	30,366

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